Ohio Academy of Science
93rd Annual Meeting

The Cleveland Museum of Natural History
And
Case Western Reserve University

Section of Geology Field Trip

April 29, 1984

Field trip leaders: Dr. Philip Banks, Department of Geological Sciences, Case Western Reserve University, M.E. Williams, Cleveland Museum of Natural History and Tom Lewis, Cleveland State University.

The annual geology field trip will visit various bedrock localities in the Cleveland area, providing a look at some of the intriguing features of these units and reviewing modern theories about their environments of deposition.

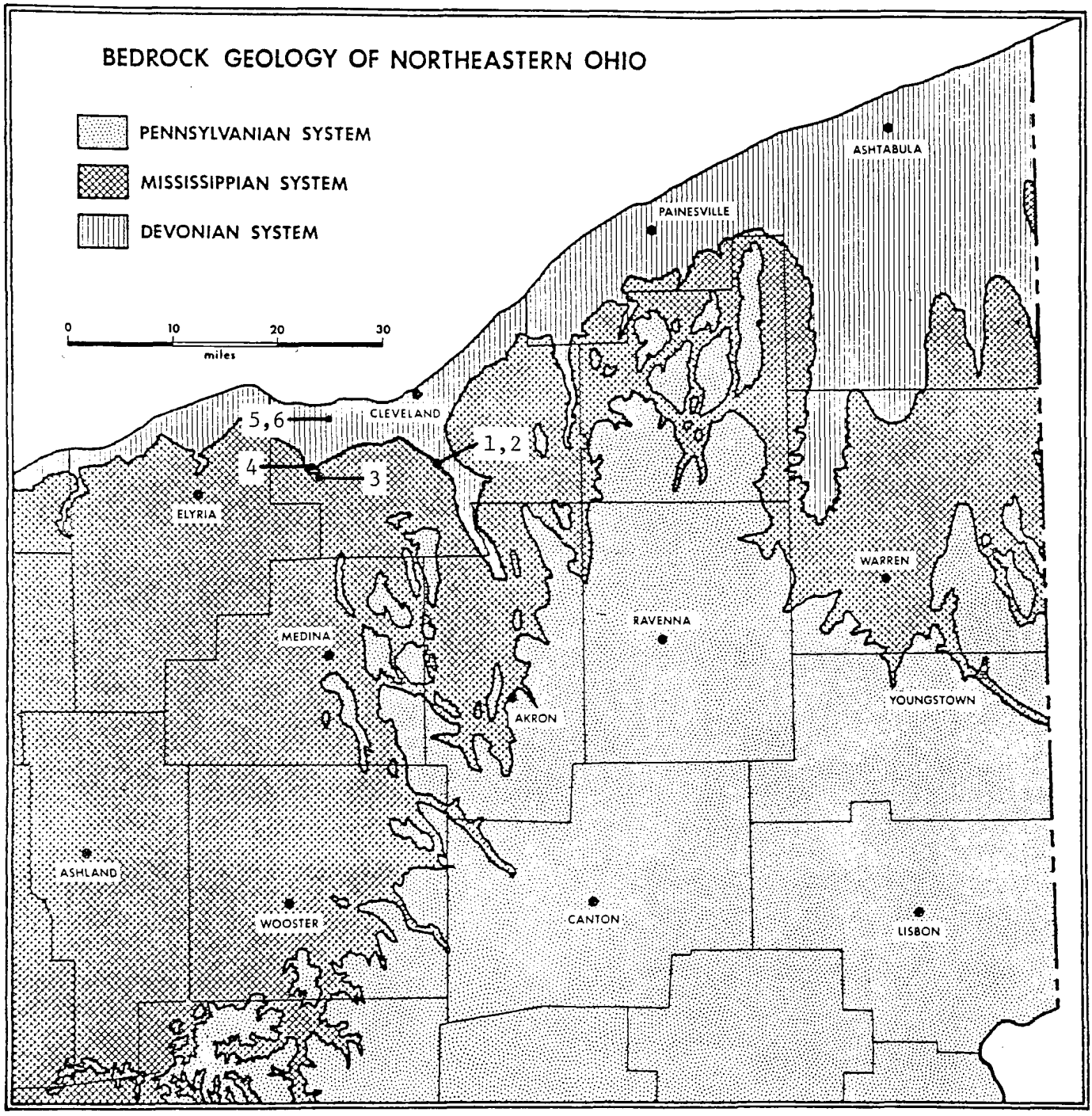
The trip will depart at 8:30 a.m. on Sunday, April 29, 1984 from the parking lot on the south side of Adelbert Gymnasium on the Case campus. The trip will last about five hours. Lunch will be provided.

[Information copied from the Annual Meeting Program and notes on guidebook.]

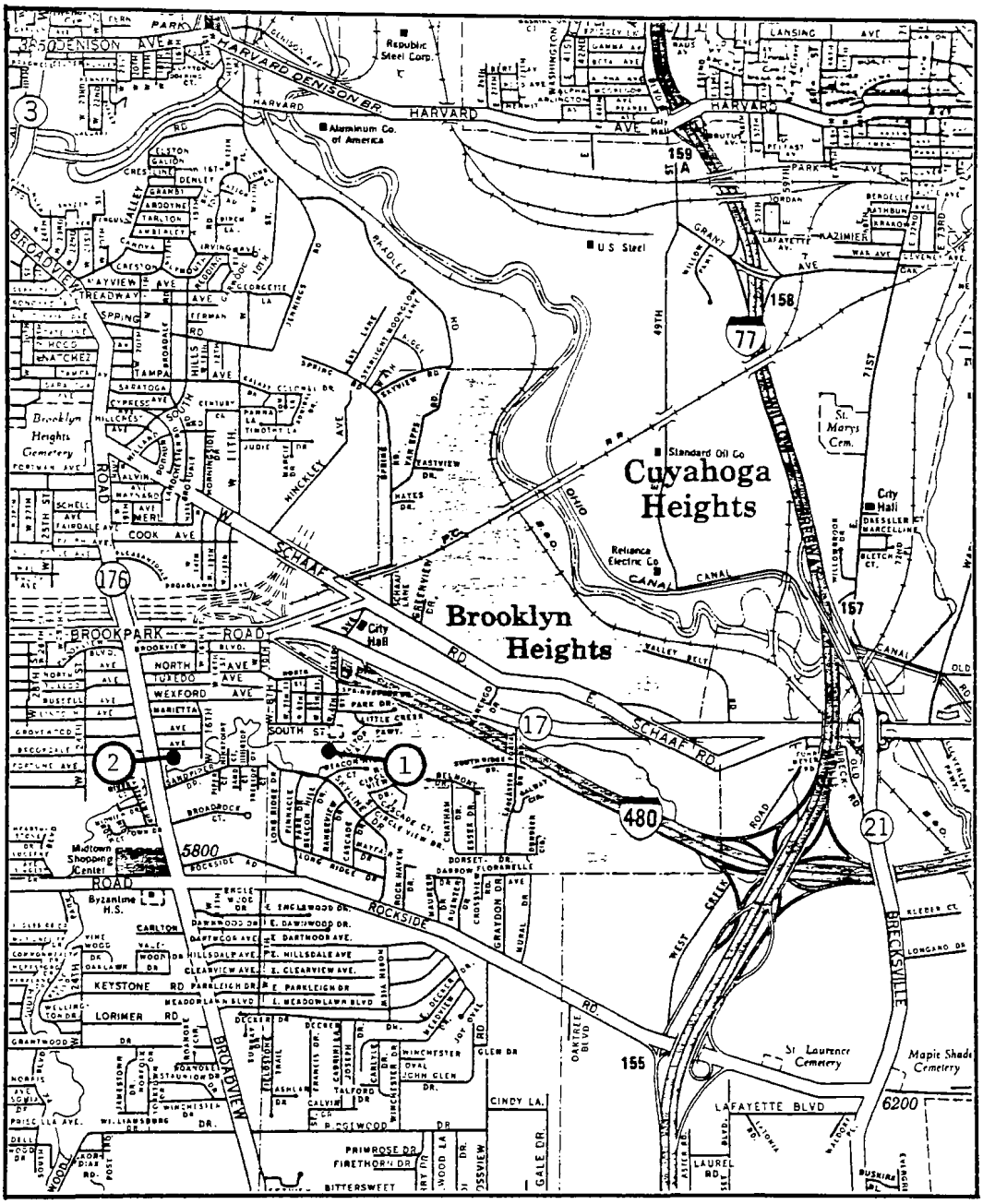
OHIO ACADEMY OF SCIENCE

GEOLOGY FIELD TRIP

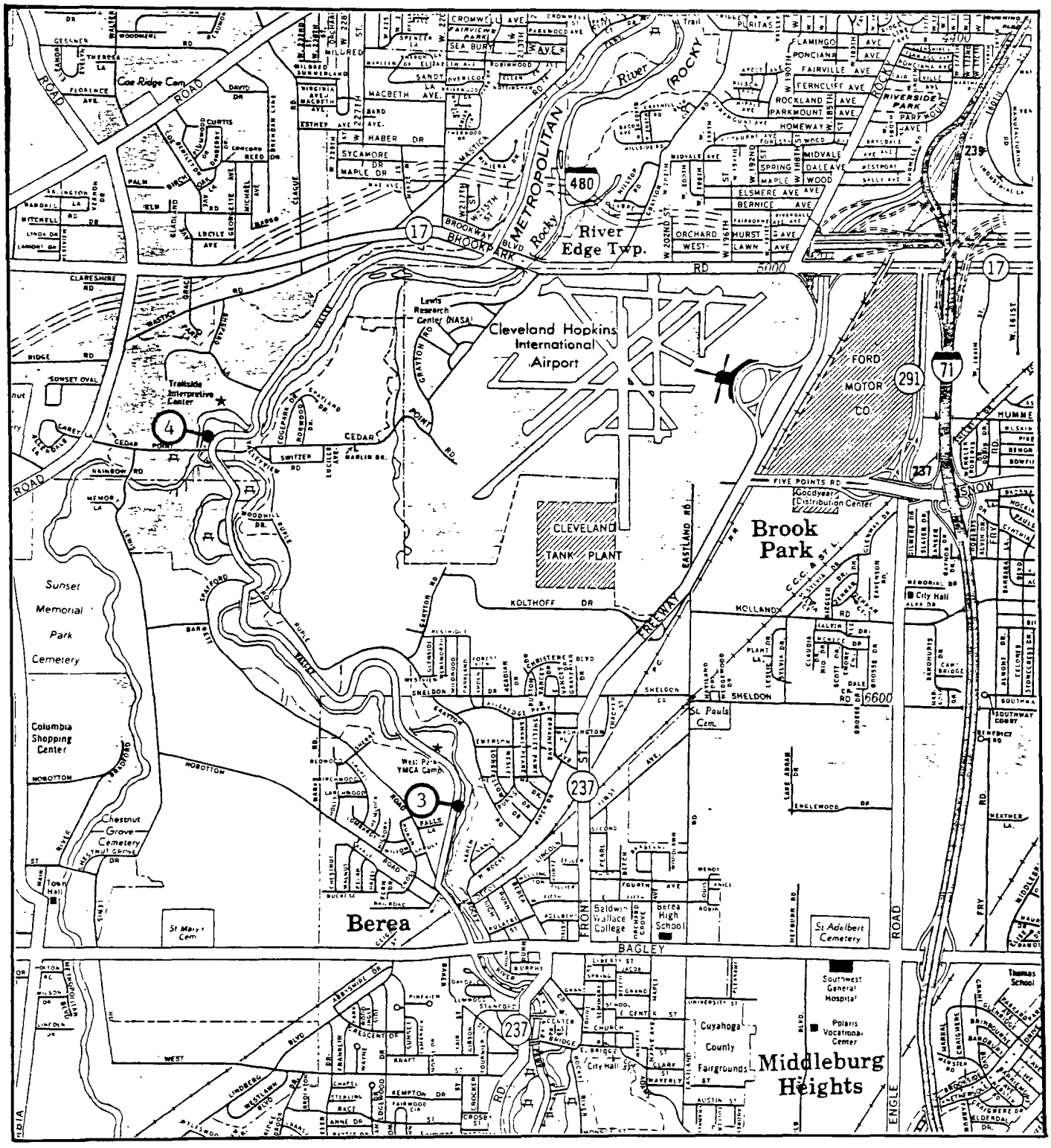
April 29, 1984



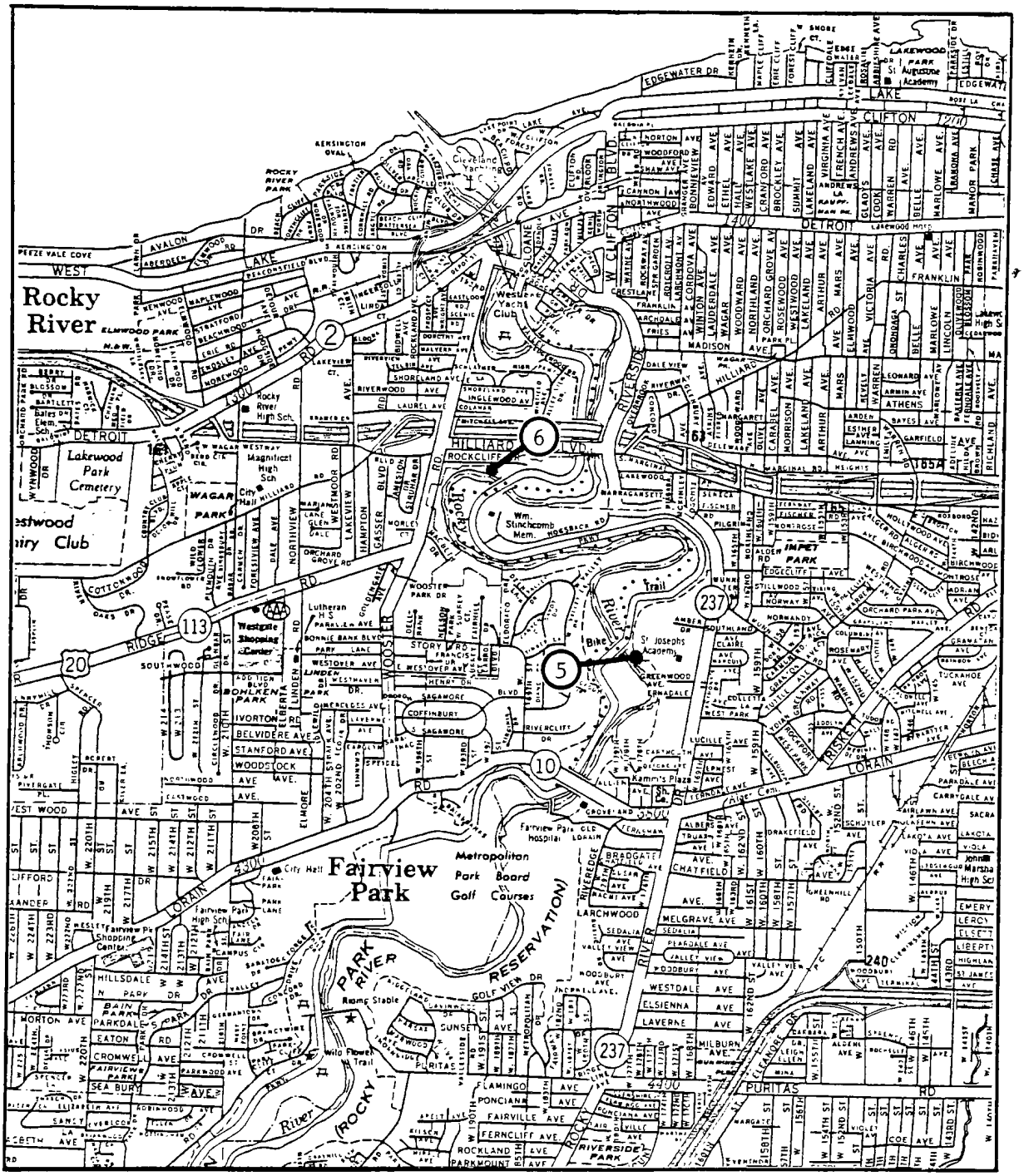
GENERALIZED LOCATION MAP FOR FIELD TRIP STOPS



FIELD TRIP STOPS 1 AND 2



FIELD TRIP STOPS 3 AND 4



OPTIONAL FIELD TRIP STOPS 5 AND 6

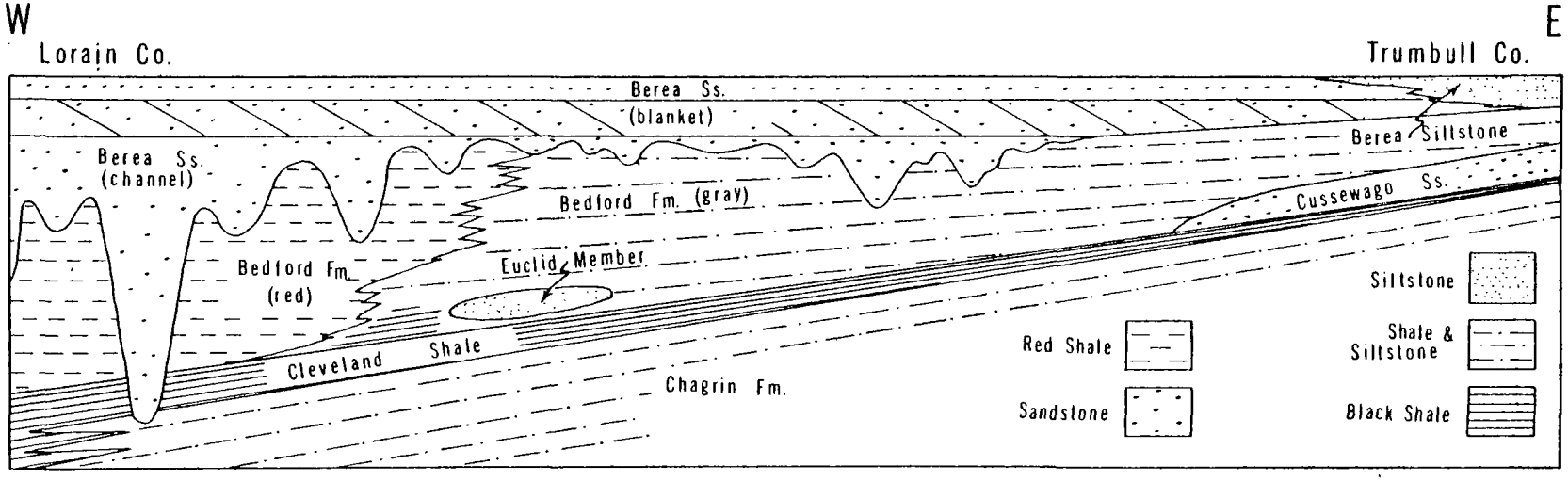


FIGURE 2. Diagrammatic east-west stratigraphic section across northeastern Ohio showing relations of pre-Cuyahoga rock units. Vertical dimension greatly exaggerated.

From Szmuc (1970)

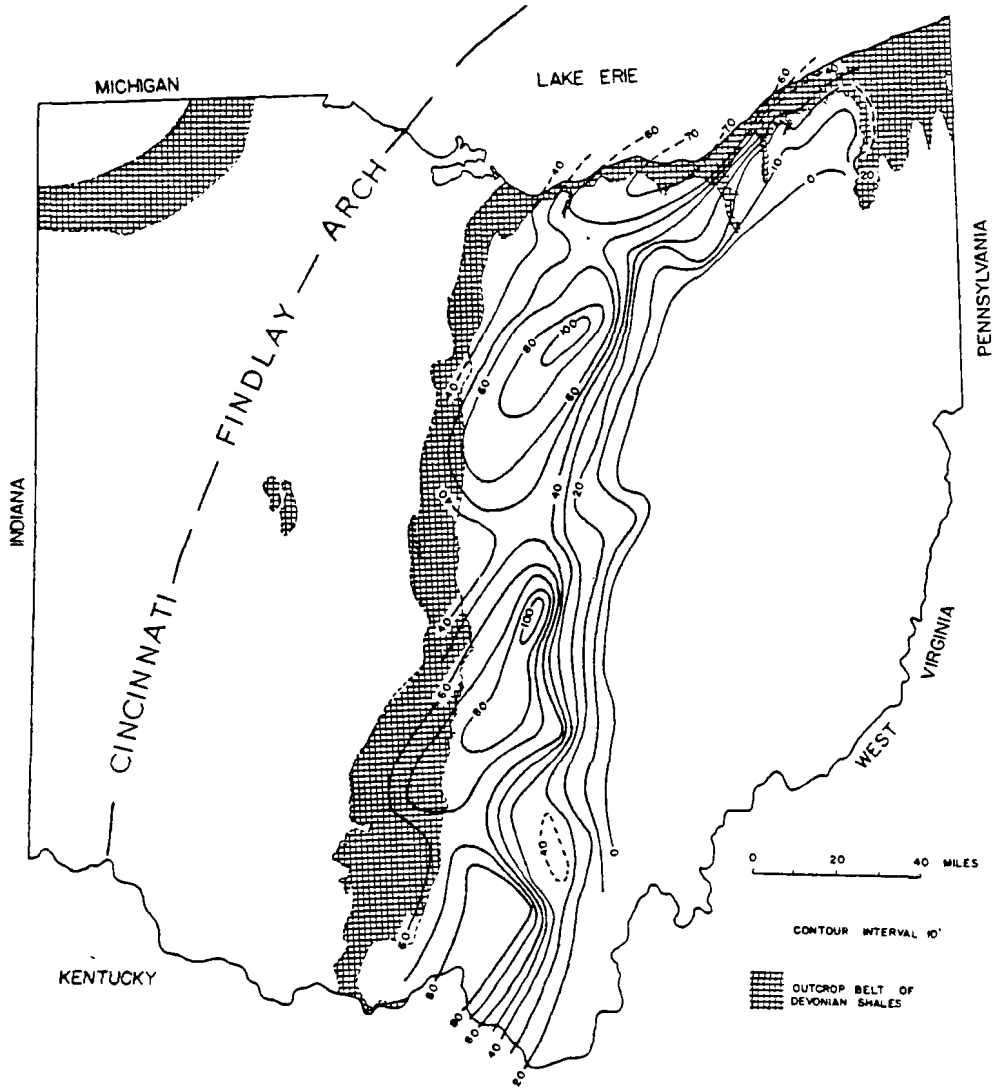
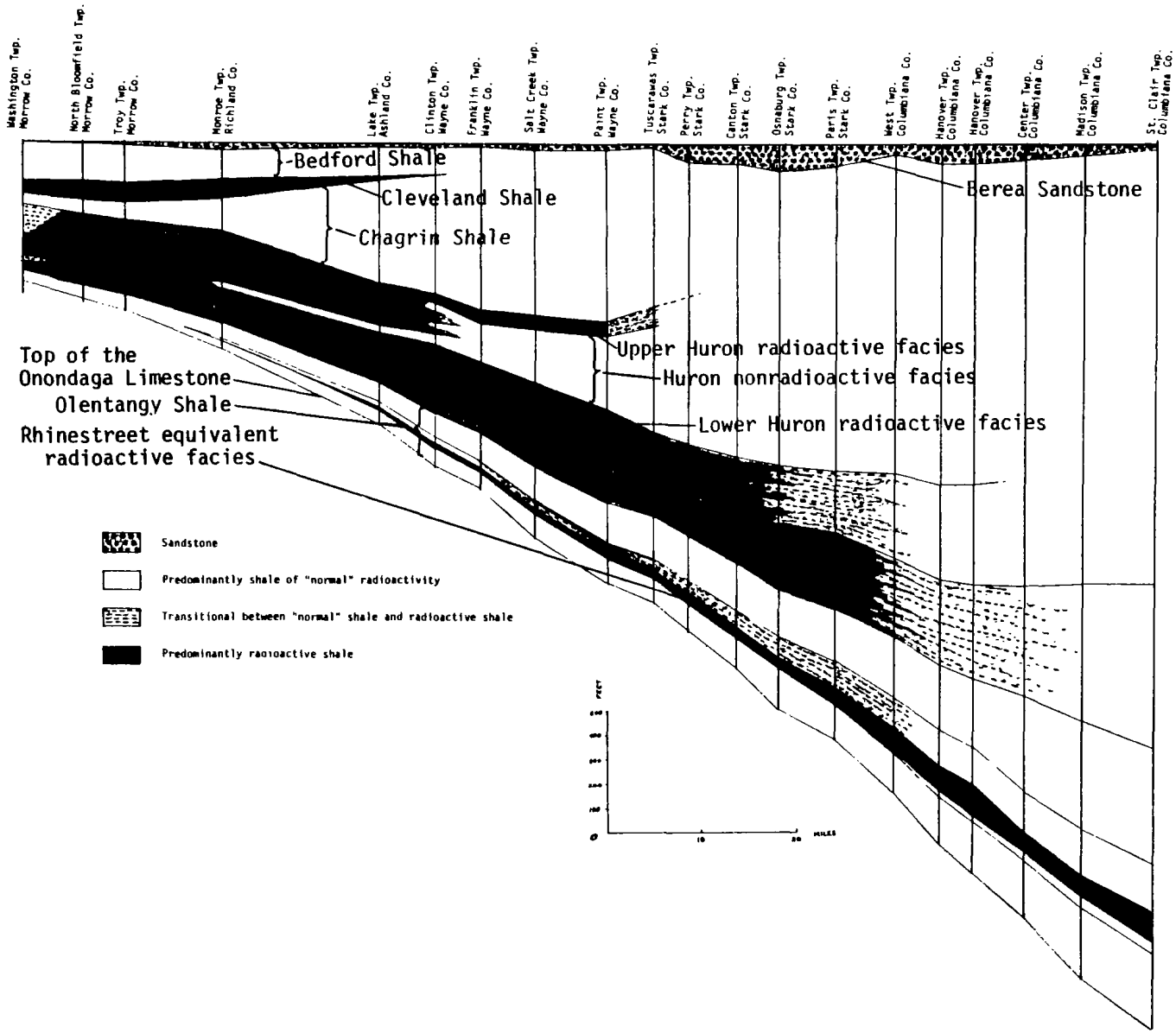


Figure 3. Isopach map of the Cleveland Shale.

From Lewis and Schwietering (1971)

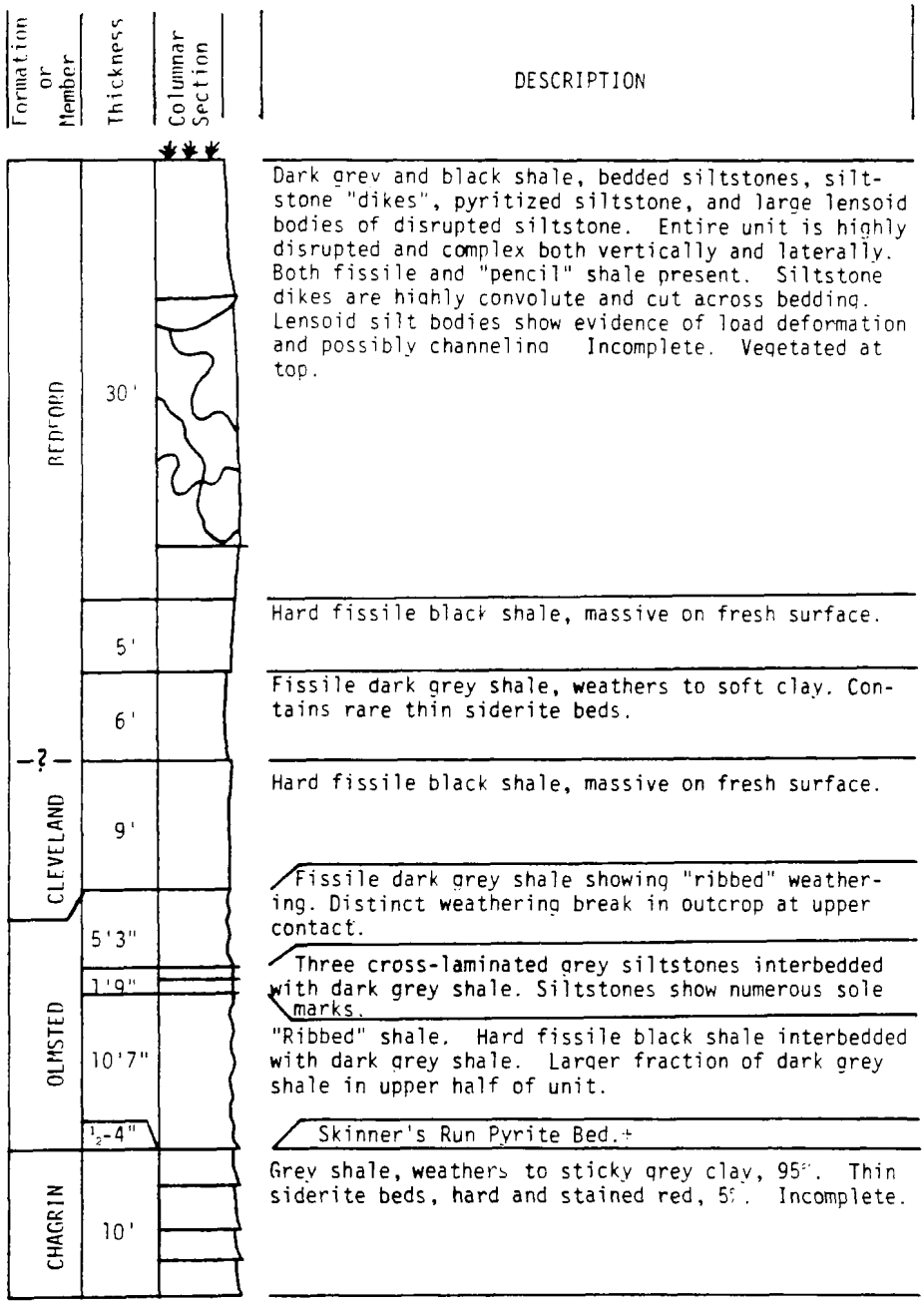


Generalized cross section illustrating the stratigraphic relationships of the geologic units and radioactive facies comprising the Devonian shales sequence in Ohio

From Majchszak (1977)

STRATIGRAPHIC SECTION AT SKINNER'S RUN

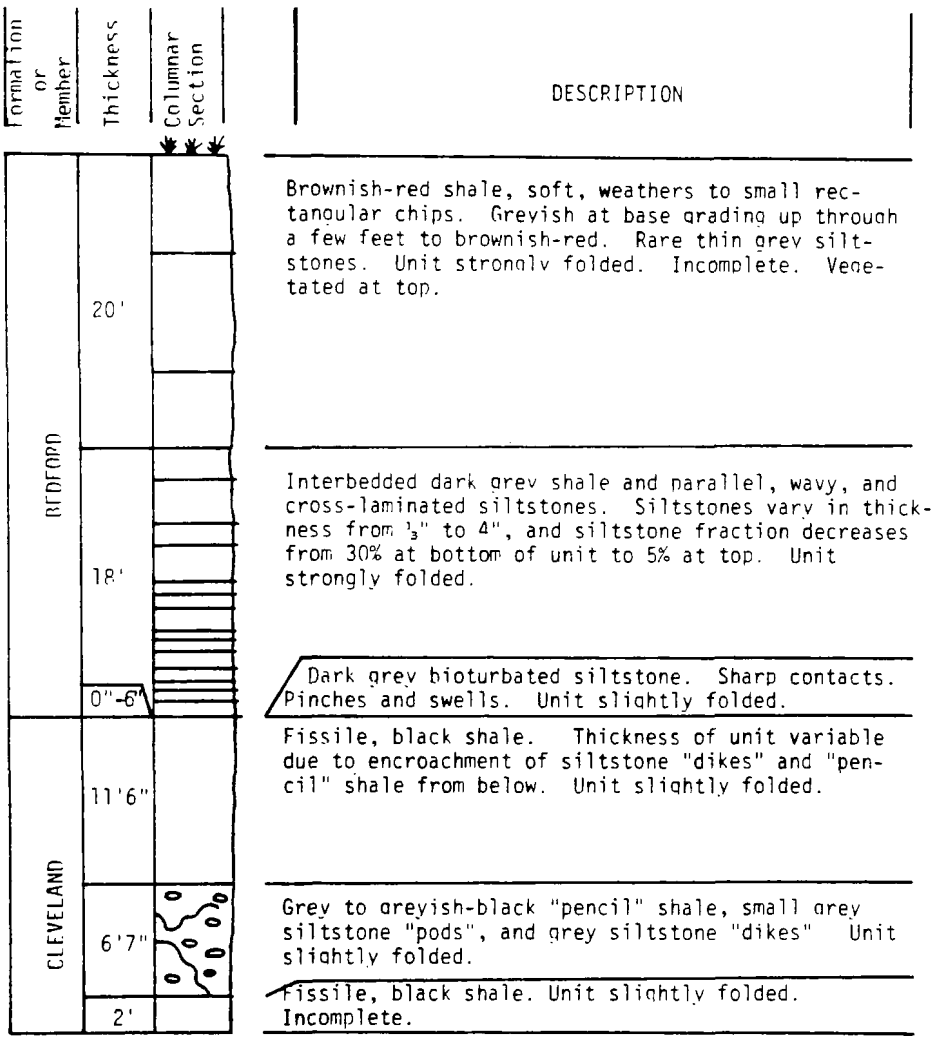
(Stops 1 and 2)



From Mausser (1982)

STRATIGRAPHIC SECTION AT ROCKY RIVER/BEREA

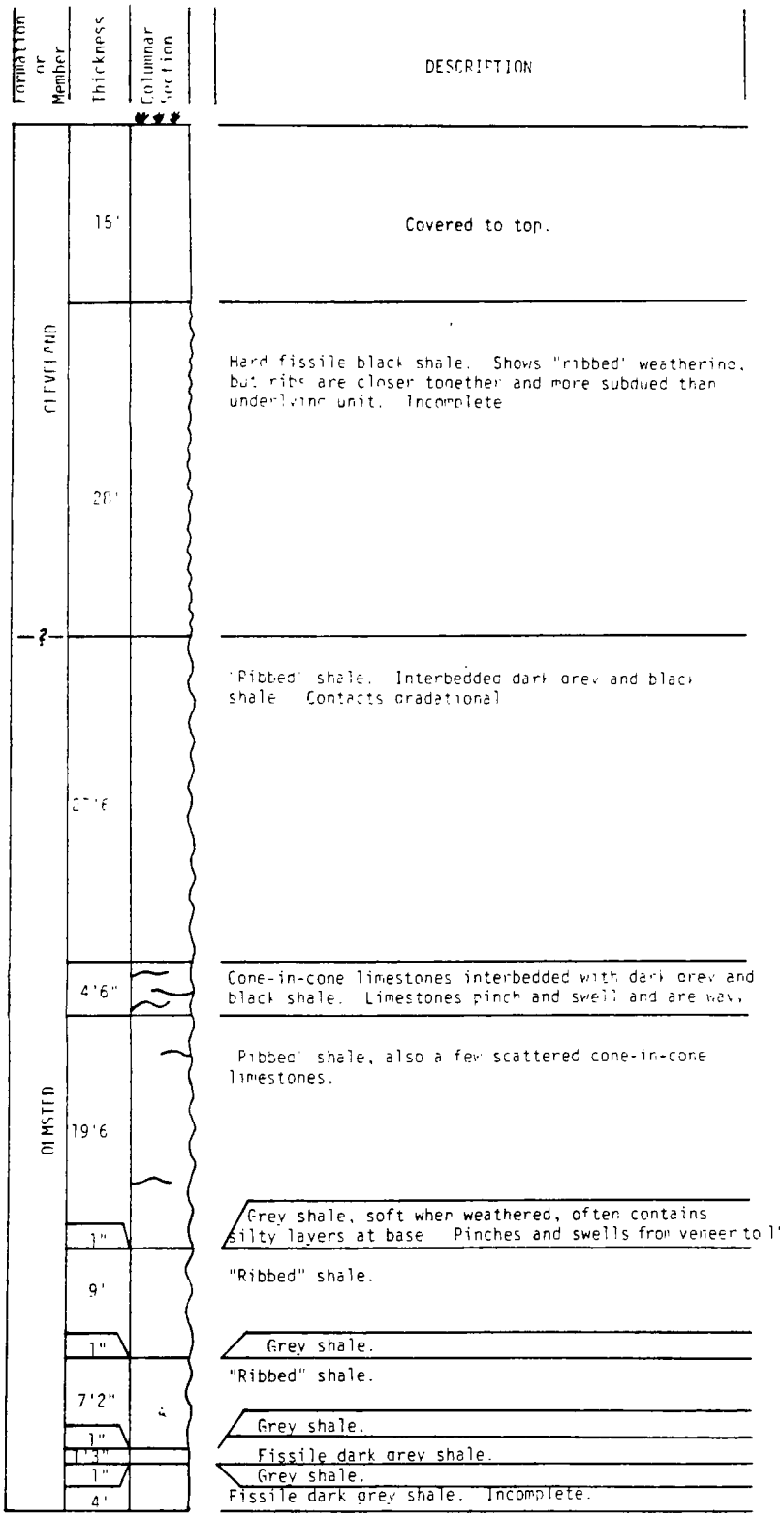
(Stop 3)



From Mausser (1982)

STRATIGRAPHIC SECTION AT ROCKY RIVER/CEDAR POINT

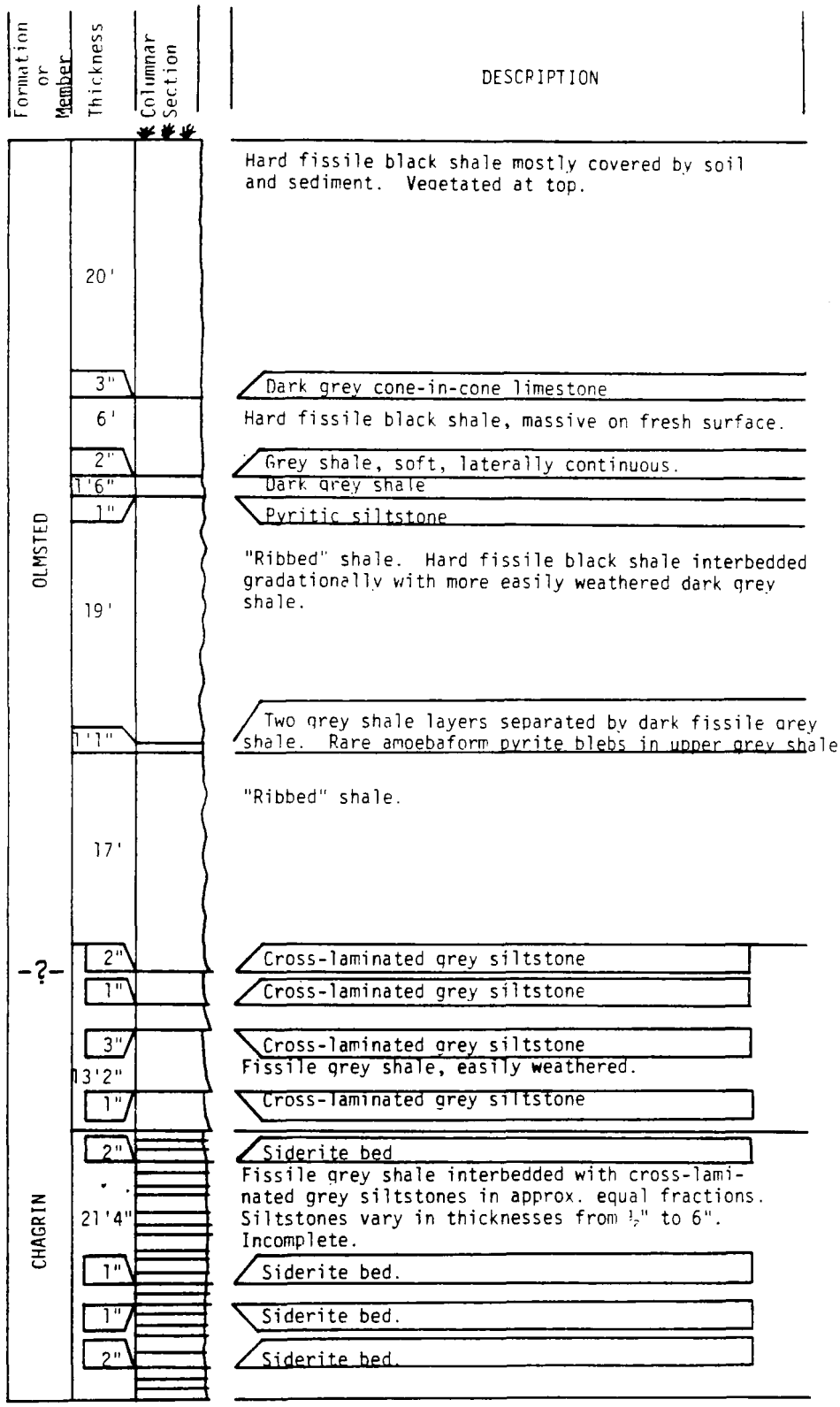
(Stop 4)



From Mausser (1982)

STRATIGRAPHIC SECTION AT ROCKY RIVER/LORAIN AVE.

(Stop 5)



From Mausser (1982)

TOPICS FOR DISCUSSION

Bedrock formations exposed in the Cleveland area consist of shales, siltstones, and sandstones deposited in offshore marine to deltaic environments in Devono-Mississippian times. Despite the apparent simplicity of these units, numerous points of controversial interpretation have arisen and persisted over the years. Some that you might like to discuss on this trip are listed below, along with a few of the alternative explanations that have been proposed.

Chagrin Shale

- How do siderite beds form?
  - Diagenetic replacement
  - Precipitation from circulating groundwater
  - Unusual chemistry at the depositional sediment/water interface

Cleveland Shale

- What was the environment of deposition?
  - Shelf-slope to deep basin, dominated by turbidity currents
  - Shallow-shelf, above base of storm waves
  - Marginal restricted basins
- Why is the organic content so high compared to most shales?
  - Anoxic deep basin
  - Bottom circulation restricted by basin geometry or abundant plant life
  - Excessive organic productivity in overlying water column
  - Climatic effects on currents, upwelling, mixing, and sediment input
- How do pyrite "bone beds" form?
  - Depositional hiatus, pyritization, and reworking as a lag gravel
  - Brief interval of subaerial(?) exposure, followed later by diagenetic pyritization

Bedford Formation

- What causes some of the Bedford shales to be red?
  - Intermittent subaerial exposure on tidal flats
  - Different source terrain than earlier formations
- Why are some of the Bedford shales and siltstones deformed?
  - Downslope movement of soft sediments
  - Foundering of massive silt or sand bars and lenses into soft muds beneath

Berea Sandstone

- What is the significance of the so-called channel structures?
  - Post-Bedford pre-Berea erosional unconformity
  - Foundering of sand bodies into underlying muds
- What sort of deltaic environment does the Berea represent?
  - Wave-, tide-, or river-dominated?
  - Is there a possible component of aeolian dune deposits?